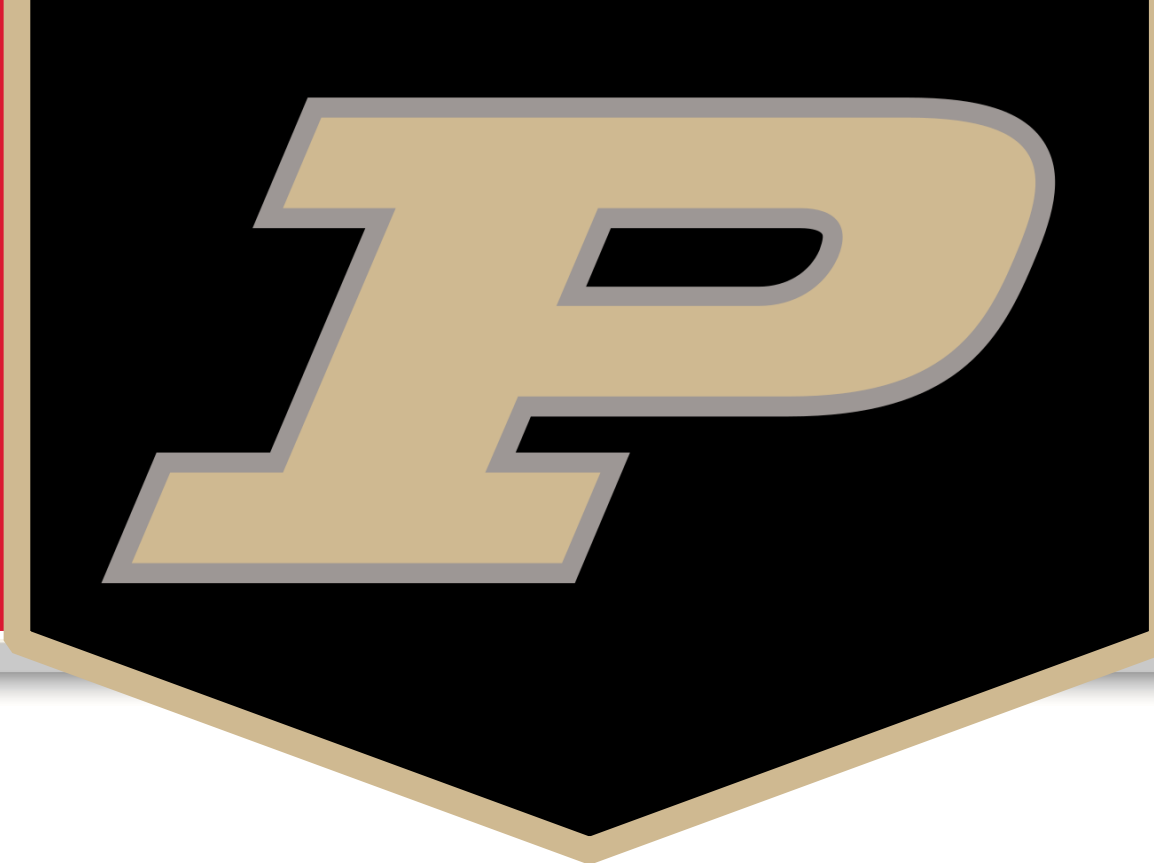




Complexion of the Complex: Engineering Course Environment Complexity Trends

Madelyn Milharcic^a, Heidi Diefes-Dux^b, Grace Panther^b

^aPurdue University, ^bUniversity of Nebraska - Lincoln



Background

- Course complexity linked to higher quality graduates¹
- Course complexity refers to Wide Array of Teaching Practices and Strategies (WATPS)
- Pandemic demanded change in WATPS used in classrooms²
- WATPS includes learning environment aspects
- Two aspects of a WATPS, (1) Instructor Rapport and (2) Transparency and Fairness examined

Purpose

1. Detect change in course complexity scores for Instructor Rapport; Transparency and Fairness
2. If present, look for trends surrounding pandemic in course complexity scores

Methods

Data: Three sophomore level course syllabi within a certain engineering program at a midwestern R1 university

Collection Period: Semesters S19 - S23, Courses A and B offered spring only, Course C offered fall only (no data available for S19 or COVID Update)

Analysis: Deductively coded for ABET standards and environment factors

Interrater Reliability: Coders established minimum of 80% simple agreement

Results

Average ABET scores (0-4)³ from S19 - S23

Course Type		Technical Measurements			Professional Learning			
		ABET1 (STEM)	ABET2 (Design)	ABET6 (Exp/Data)	ABET3 (Comm)	ABET4 (Ethics)	ABET5 (Team/Lead)	ABET7 (Learn.Strat.)
Course A	S19-S23	4.00	0.67	0.89	0.22	0.22	0.22	0.67
Course B	S19-S23	3.41	0.63	0.30	0.67	1.07	0.74	0.30
Course C	F19-F22	2.50	0.25	2.75	2.25	0.00	2.00	0.00

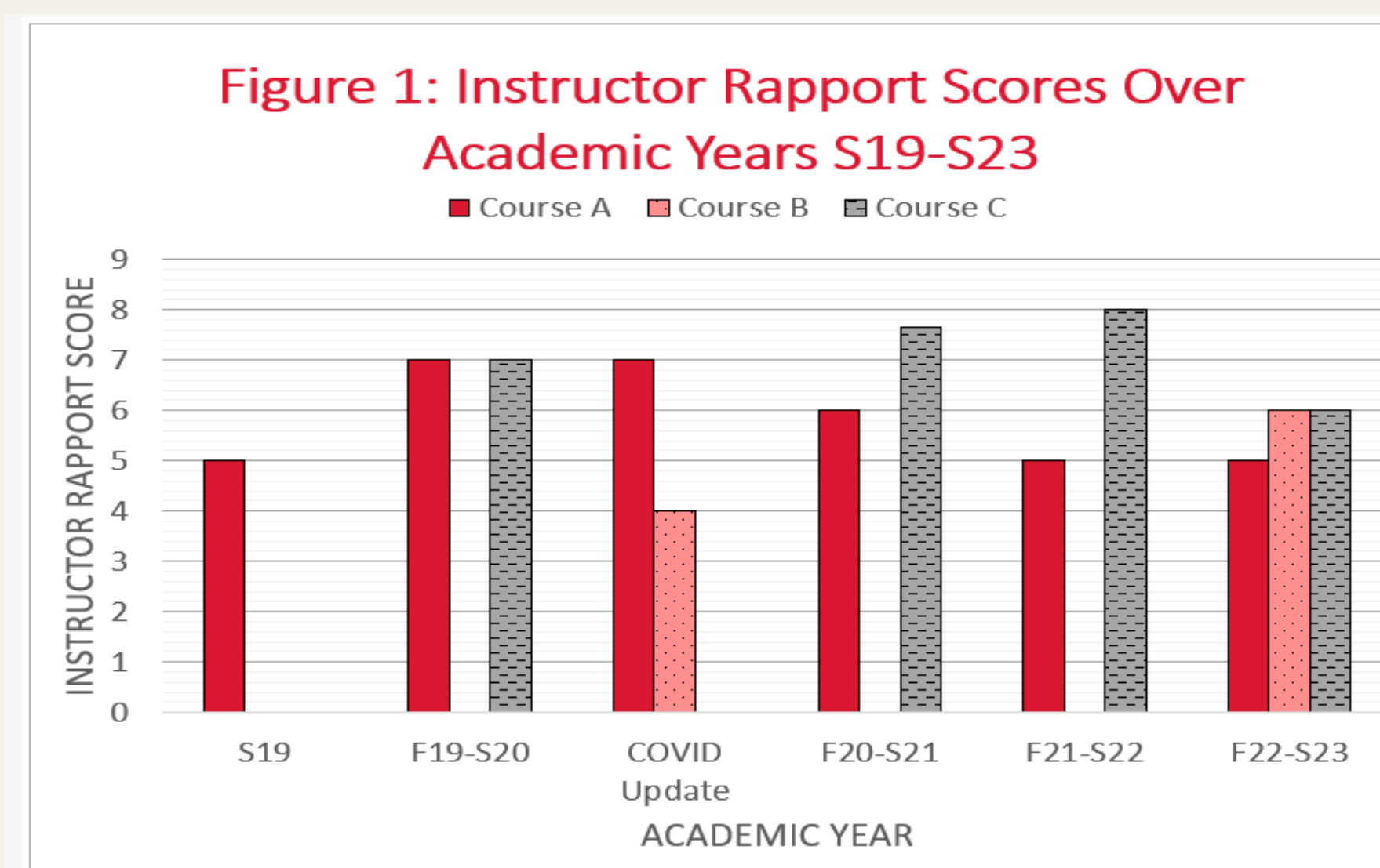


Figure 1:

- No consistent increase after pandemic
- Course B rarely had Instructor Rapport indicators (mode = 0)
- Trends varied by course:
 - Course A decreased
 - Course B generally decreased until F22-S23 year
 - Course C generally rose until decrease in F22-S23

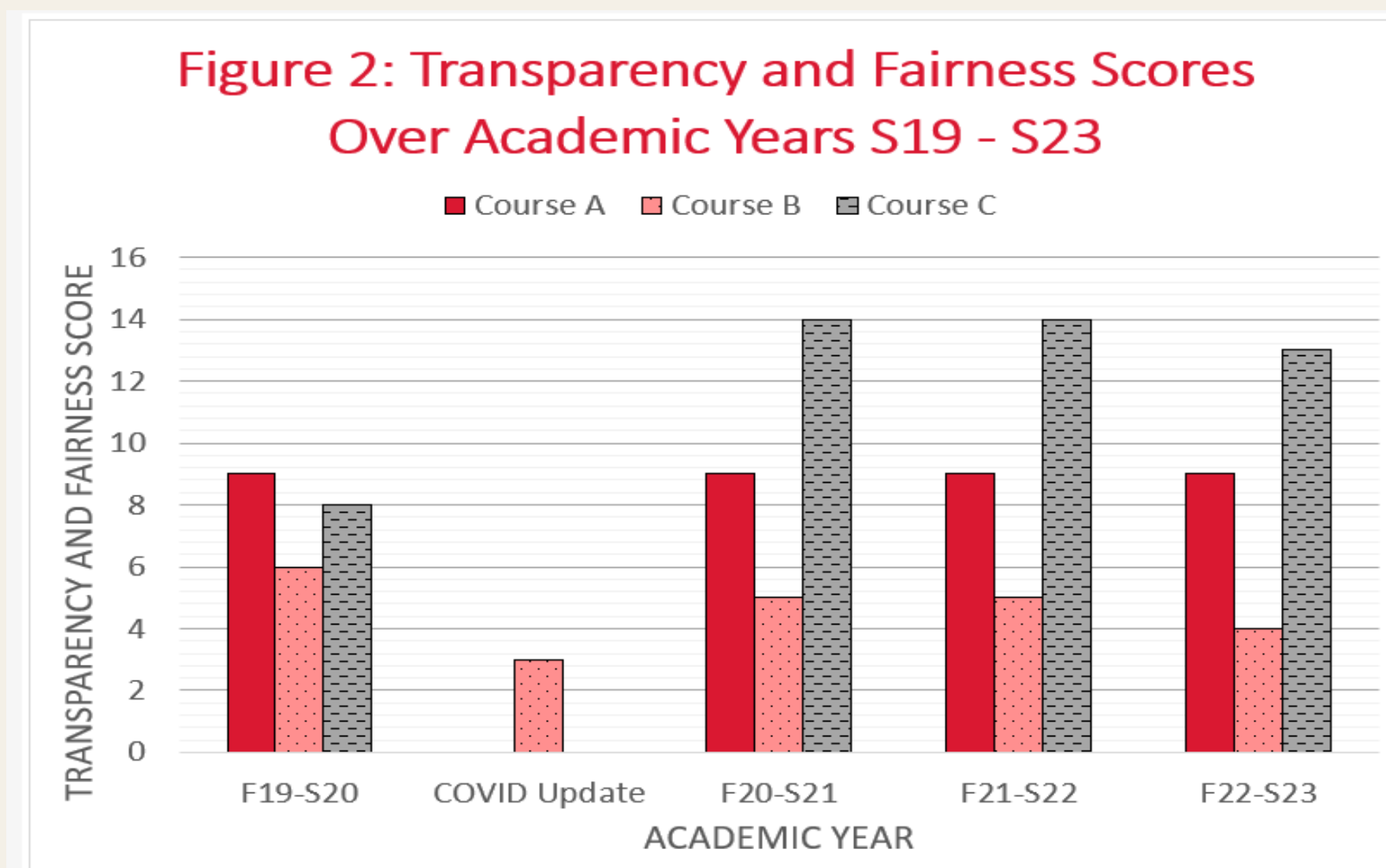


Figure 2:

- Course A and B show no increase post-pandemic
- Course C shows consistent increase post-pandemic

Conclusion

All instructors did not improve environmental aspects in reaction to the pandemic

- Each course demonstrates unique trends
- Course complexity scores average to “Normal/Traditional” (3-5)
- Maximum scores never exceed “Some” (11-15)
- Scores do not reach “A Lot” (16+)
- General need for greater attention to classroom environment remains

Future Studies

- Studies with increased sampling (large *n*) to look for trends across variety of engineering courses
- Studies to focus on how to sustain increase in complexity
- Studies on increasing classroom environment aspects (why are they not prevalent)
- Understand why some instructors react to disruption by increasing and some by decreasing classroom environment complexity

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Acknowledgements



This work was made possible by a grant from the National Science Foundation (NSF REU 2244323, NSF RFE 2105156). Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

Codes:	General Definition	Examples
ABET	Technical: necessary engineering abilities	ABET1 (STEM problem solving), ABET2 (Design), ABET6 (Experimentation)
ABET	Professional: “soft skills” used in workplace	ABET3: (Communication), ABET4: (Ethics), ABET5: (Teamwork and leadership), ABET7: (Learning strategies)
Environ.	Inst. Rapport: gen. expectations about course policies	Office hour details, Course penalties and leniencies, Justification of activities/policies
Environ.	Transparency and Fairness: gen. accessibility and academic equity	Presence of daily schedule, Grading expectations, Justification of activities/policies

	Scoring Metric	
	Instructor Rapport	Transparency and Fairness
Codes Used	A. Office hours (0 - 2)	A. Daily Schedule (0-2)
	B. Office hours location (0 - 1)	B. Assignment Details (0-3)
	C. No. methods for student to communicate	C. Grading Scheme (0-1)
	D.No. methods for instructor to communicate	D. Letter Grade Assign. (0-1)
	E.Net No. Penalties (Pen. - Len)	E. Academic Integrity (0-4)
		F. Exp. for Effort (0-4)
Score		G. Grading method exp. (0-1)
		H. Inst. Just. Academic (0-3)
		I. Inst. Just. Pro. (0-3)
	Sum (A to E)	Sum (A to I)